

# Graduate Student Handbook



## M.S. and Ph.D.

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# Welcome Letter

Dear BME Graduate Student:

Welcome to the Stony Brook University Department of Biomedical Engineering (BME) Graduate Program! You have joined an elite, diverse and highly enthusiastic group of faculty, staff and students. The Department of BME is composed of world renowned scholars from numerous countries. Each of the faculty have a different set of skills and interests that we hope will help you complete your journey towards a post-baccalaureate degree. Your scholarly works and educational activities will help to bring our department and graduate program to new levels of excellence. We are excited about the opportunity to help you reach your scientific potential.

The intention of this manual is to guide you through your graduate degree. The information that is contained within this manual should provide you with a brief overview of the requirements that must be satisfied for you to obtain a graduate degree. For reference, there are requirements from the Department of BME, the Graduate School of Stony Brook University and Stony Brook University themselves. Please also be mindful that these requirements can and may change during your degree progression. We will make every effort to update you of these changes so that you can plan your courses accordingly to meet the updated requirements. Many times these updates will be posted on various Stony Brook University websites. As we become aware of new requirements that may affect your degree progression, we will contact you via email with the update and suggestions (as necessary) to satisfy those new requirements. The University and Department of BME will primarily contact you through your official local contact information, your official permanent address and/or your official Stony Brook email (e.g. [firstname.lastname@stonybrook.edu](mailto:firstname.lastname@stonybrook.edu)). Thus, it is imperative that you 1) keep this information up-to-date and 2) check these delivery sites often.

The Department of Biomedical Engineering will assist you in many areas of your Graduate studies. We are typically your first point of contact for questions regarding, degree progression, degree requirements, payroll among other topics relevant to your degree. However, be aware that, ultimately it is your responsibility to know and satisfy all BME, Graduate School, University and other (e.g. immigration) requirements for attaining your degree.

We look forward to working with you and helping you to attain your degree.

With Regards,



David A. Rubenstein, Ph.D.  
Associate Professor and Graduate Program Director  
Biomedical Engineering  
Stony Brook University

# Admission Process

To qualify for admission to the Graduate Program in Biomedical Engineering, you must possess an undergraduate or graduate degree from a recognized college or university, typically in an engineering or physical sciences field relevant to your field of study at Stony Brook University. You must rank in the upper fifteen percent of your class or have a cumulative “B” average in courses for your major. There are three typical means in which you can be admitted into the BME Graduate Program:

- 1) 5-year Accelerated Master’s Program: this is for current BME undergraduate students and it is required to have a 3.5 GPA in courses relevant to your field of study. Students completing this program can go directly into an industry position or continue their education in a Ph.D. program (at Stony Brook University or another University).
- 2) Master’s Program: this is for students that anticipate completing their studies with the Biomedical Engineering Department at Stony Brook University with a Master’s degree. It is required to have an undergraduate degree relevant to your field of study. Students completing this program can go directly into an industry position or continue their education in a Ph.D. program (at Stony Brook University or another University).
- 3) Doctoral Program: this is for students that anticipate completing their studies with the Biomedical Engineering Department at Stony Brook University with a Ph.D. degree. It is required that students have either an undergraduate degree and/or a Master’s degree relevant to your field of study. Students with only an undergraduate degree can and should earn a Master’s degree while completing their Ph.D. work. If you have a Master’s degree already, it would be expected that you have an advisor before you can be fully admitted into the program. Your application will be circulated among relevant BME faculty in your area(s) of interest, but it may be more efficient if you have previously contacted and made arrangements with a faculty member. Students completing this program can go directly into an industry position or continue in an academic position.

All applicants to the BME Graduate program must be submitted through Stony Brook University’s online application site. Please visit: <https://www.grad.stonybrook.edu/> for more information and to submit your application. You must create an account and you are responsible for submitting all of the required documents and ensuring that references, etc., are also submitted in a timely manner. Incomplete applications may not be given full consideration during the application review process. The application fee and the following documents must be submitted by January 15<sup>th</sup> of the current year to receive full consideration for Fall Admission:

- Completed Online Application (not required for the 5-year Accelerated Master’s Students)
- GRE Scores (not required for the 5-year Accelerated Master’s Students)
- Original Transcript from each College/University Previously Attended (translated/verified in English) (Stony Brook University transcripts are not required)
- Professional Resume
- Personal Statement that indicates your area of interest within the BME Department, why this area interests you, a minimum of three faculty members that you envision working with (not required for the 5-year Accelerated Master’s Students)

- Three Letters of Recommendation (typed on official letterhead) (not required for the 5-year Accelerated Master's Students)

Upon acceptance, you will automatically be considered for teaching and/or research assistantships, with preference going first to doctoral candidates followed by master's candidates. *Please do not correspond with our department regarding the possibility of obtaining these financial aid opportunities.* There are a number of opportunities for financial aid external to our department that are either internal to the University (e.g. the Graduate Council Fellowship) or external to the University. If you are selected as a nominee for one of the internal awards, the department can help to facilitate your application and in many cases the applicant does not need to do anything other than apply for graduate studies in BME. However, for those opportunities external to the University, it is the responsibility of the applicant to apply and the department can help as needed, provided sufficient notice is given to the department in advance of any deadline.

Upon acceptance, we will immediately email, to the email address listed on your application to graduate studies, a PDF of an official offer letter. This letter will describe any financial aid that the department will provide and the criteria for continued eligibility for this aid. If awards are granted external to the department, those awarding departments will contact the student directly and typically these offers are made after the admissions offer from BME. To be considered for a research assistantship, the applicant must directly contact either core BME faculty or program BME faculty. In general, master's students will not be offered a research assistantship until demonstrating to the relevant faculty member, motivation, hard work and proficiency in both research projects and coursework. Doctoral students are sometimes offered a research assistantship at the same time as admissions but it is imperative that the doctoral student identifies a lab and faculty member that will support them for their studies. It is important for admitted students to read their offer letters very carefully prior to accepting the offer. These offers will describe both financial liabilities and financial assistantships that may impact your studies. Please be sure to fully understand these offers and what is expected of you once you accept the offer.

If your application materials are incomplete, you will not receive full consideration to the department. It is the applicant's responsibility to ensure that all standardized test scores, transcripts and reference letters are submitted with the application. The Graduate Program Coordinator may contact you directly if we find any of these items are missing. Please do not correspond with the Department of BME regarding admission status – we cannot provide admission decisions prior to the admission review process.



## BME Core Graduate Faculty

Name	Education	Area(s) of Interest
Arbab, M. H. Assistant Professor	Ph.D., University of Washington M.S., University of Washington B.S., Shahid Beheshti University	Biomedical Imaging, Terahertz Spectroscopy, Ultrafast Photonics
Balazsi, G. Henry Laufer Associate Professor	Ph.D., University of Missouri M.Sc., University of Missouri/ Babes-Bolyai University B.Sc., Babes-Bolyai University	Synthetic Gene Circuits Evolution, Development and Cancer
Bluestein, D. Professor	Ph.D., Tel Aviv University M.Sc., Tel Aviv University B.Sc., Technion	Computation Fluid Dynamics Fluid Structure Interaction Multiscale Modeling Cardiovascular Pathologies
Brouzes, E. Assistant Professor	Ph.D., Universite Denis Diderot M.Sc., Universite Denis Diderot	Tissue Heterogeneity Droplet Microfluidics Single-Cell Analysis
Chan, M.L. Assistant Professor	Ph.D., Columbia University M.S., Columbia University B.S., Hong Kong Polytechnic	Bone Adaptation Mechanotransduction Osteoimmunology
Clark, R.A.F. Professor	M.D., University of Rochester M.S. University of Rochester S.B. Massachusetts Institute of Technology	Cutaneous Wounds Tissue Engineering Smart Gels
Du, C. Professor	Ph.D., University of Luebeck M.S., University of Pittsburgh B.S., Huazhong University of Science and Technology	Optical Instrumentation Drug-Induced Abnormalities of Brain Function
Frame, M.D. Associate Professor Undergraduate Program Director	Ph.D., University of Missouri A.B., University of Missouri	Signal Transduction Microcirculation Blood Flow Vasoactive Mechanisms
Jai, S. Assistant Professor	Ph.D., Princeton University B.S., Tsinghua University	Biophotonic Technologies Super Resolution Microscopy
Judex, S. Professor	Ph.D., University of Calgary M.Sc., Technical University Munich B.Sc., Technical University Munich	Musculo-Skeletal Regulation Biomechanics Gene Regulation
Lin, W. Associate Professor	Ph.D., Stony Brook University	Embedded Systems High Performance Computing Medical Devices
Mujica-Parodi, L. Associate Professor	Ph.D., Columbia University B.A., Georgetown University	Non-Invasive Neural Signals Dynamic System Analysis Functional MRI

Pan, Y.T. Professor	Ph.D., National Laser Technology Laboratory, China M.S./B.E., Huazhong University of Science and Technology	Optical Coherence Tomography Cancer Diagnosis Brain Imaging
Qin, Y.X. Professor	Ph.D., Stony Brook University	Ultrasound Technologies Diagnosis of Metabolic Bone Diseases
Rubenstein, D.A. Associate Professor Graduate Program Director	Ph.D., Stony Brook University M.S., Stony Brook University B.E., Stony Brook University	Microvascular Tissue Engineering Cardiovascular Diseases
Rubin, C.T. Distinguished Professor Chair	Ph.D., University of Bristol B.A., Harvard University	Biomechanical Stimuli Osteopenia Fate Selection of Stem Cells
Sitharaman, B. Associate Professor	Ph.D., Rice University M.A., Rice University B.S., Indian Institute of Technology	Molecular Diagnostics Drug Delivery Biomaterials/Tissue Engineering
Strey, H. Associate Professor	Ph.D., Technical University Munich Diploma in Physics, Technical University Munich	Self-Assembly Biosensors Micro/Nanofluidics
Vaska, P. Professor	Ph.D., Stony Brook University M.S., Stony Brook University B.S., Clarkson University	Medical Imaging Bioinstrumentation
Yin, W. Associate Professor	Ph.D., Stony Brook University M.S., University of Akron B.E., Tianjin University	Computational Fluid Dynamics Disturbed Blood Flow Cardiovascular Diseases

For More Information about each Professor and their Research Interests,  
go to: [http://www.bme.stonybrook.edu/people/faculty/fac\\_core.html](http://www.bme.stonybrook.edu/people/faculty/fac_core.html)

A listing of Program Faculty can be found at:  
[http://www.bme.sunysb.edu/people/faculty/fac\\_program.html](http://www.bme.sunysb.edu/people/faculty/fac_program.html)



# 5 Year Accelerated Master's Degree – Sequence

The following is a sequence of requirements compiled from both the Department of Biomedical Engineering and the Graduate School of Stony Brook University. Failure to comply with these requirements in a timely manner may result in enrollment holds, payroll delay (as applicable) and/or a delay in graduation.

## **Spring Semester Prior to Your “Senior” Fall Semester**

1. Contact the Graduate Program Director (carbon copy the Graduate Program Coordinator) to set-up an appointment to discuss your admissions into this program by 4/15.
2. Send a professional resume to the Graduate Program Director prior to the meeting.

## **First Semester Including Graduate Coursework (“Senior” Fall Semester)**

1. Enroll in BME 501 and BME 520.
2. If the student does not plan on completing a thesis, the student may need to enroll in an appropriate technical elective.

## **Second Semester Including Graduate Coursework (“Senior” Spring Semester)**

1. Enroll in BME 502 and BME 521.
2. If the student does not plan on completing a thesis, the student may need to enroll in an appropriate technical elective.

## **Third Semester Including Graduate Coursework (Fall Semester of 5<sup>th</sup> Year)**

1. Enroll in BME 505 and BME 509 (or equivalent).
2. Enroll in 3 Graduate Technical Electives.
3. Enroll in Research Credit Hours as Needed.

## **Fourth Semester Including Graduate Coursework (Spring Semester of 5<sup>th</sup> Year)**

1. Enroll in 3 Graduate Technical Electives.
2. Enroll in Research Credit Hours as Needed.
3. Apply for Graduation through Solar (in your final semester, check the applicable academic calendar for the deadlines).
4. If applicable, set a thesis defense time/date.

## **Notes**

1. Students are required to attend Graduate School Orientation.
2. Students are required to attend BME Student Orientation/Research Day.
3. Students are subject to Graduate School Requirements, including:
  - a. Paying Graduate Tuition and Fees (students are expected to be self-funded).
  - b. Students are no longer eligible for Undergraduate Financial Aid.
  - c. If applicable, students can no longer live in undergraduate student housing and would be required to move to graduate student housing.

## 2 Year Master's Degree – Sequence

The following is a sequence of requirements compiled from both the Department of Biomedical Engineering and the Graduate School of Stony Brook University. Failure to comply with these requirements in a timely manner may result in enrollment holds, payroll delay (as applicable) and/or a delay in graduation.

### Week of Arrival

1. All students must report to the Biomedical Engineering department and meet with the Graduate Program Coordinator to obtain a new student information packet and to schedule a meeting with either the BME Graduate Program Director or your pre-approved faculty advisor to make enrollment selections for the upcoming semester.
  - a. It is important, at this time, to decide whether or not you will attempt to complete a M.S. thesis or not. This will partially dictate the courses that you must take to complete the degree.
2. Activate your Stony Brook University email account and make sure to check in with your housing provider and visa and immigration services (as applicable).
3. If you were offered an assistantship, you will need to obtain and complete payroll forms.
4. Attend all University, Graduate School and Biomedical Engineering Department orientations, including the BME Graduate Student Research Day.

### First Semester of Coursework

1. Enroll in courses (with advice from the Graduate Program Director, the Graduate Program Coordinator and/or your pre-approved advisor) that will help you decide what track you would like to focus on and finalize your decision to complete a M.S. thesis or not.
2. Faculty advisors can be chosen from either core faculty members or program faculty members.

### Prior to Semester of Graduation

1. Meet with the Graduate Program Coordinator to see if you have met all requirements on the M.S. Student Graduation Checklist.
2. Apply for Graduation (through Solar).
3. If you are completing a thesis, make sure to schedule your final defense with sufficient time to allow for corrections and additional work requested by your faculty committee.
  - a. Note that the faculty committee must contain at least three faculty members, with a majority from the core BME faculty or Program faculty.
4. Make sure that all graduation paperwork is completed and submitted in a timely manner.
5. Complete and submit your BME Exit/Clearance Form.

# Master's Degree – Requirements

## Applicable for Both the 5 Year Accelerated and 2 Year Program

The minimal University requirements for the M.S. degree in Biomedical Engineering are determined by the Graduate School and can be found in the University Bulletin, which can be accessed at: <http://sb.cc.stonybrook.edu/gradbulletin/current/>. We in BME, have additional requirements in several areas. You have two options for the completion of your M.S. degree.

### M.S. Thesis

A minimum of 37 graduate credits, which includes a total of **31 graduate credit hours of formal coursework** and **6 graduate credit hours of BME 599**. Please refer to the table below for more information.

### Non-Thesis

A minimum of **31 graduate credits, all of which is gained by formal coursework**. Please refer to the table below for more information.

Table 1: Typical Plan of Study for M.S. Students

	Required Core Courses	Business Management <sup>1</sup>	Technical Electives <sup>2</sup>	Research
<b>M.S. Thesis</b>	BME 501 BME 502 BME 505 BME 520 BME 521	BME 509 (or petition for equivalent)	6 Graduate Level Courses	6 Hours of BME 599
<b>Non-Thesis</b>	BME 501 BME 502 BME 505 BME 520 BME 521	BME 509 (or petition for equivalent)	6 Graduate Level Courses	None

<sup>1</sup> MBA 501 through 511 are pre-approved to satisfy this requirement.

<sup>2</sup> Note that 3 technical electives must be BME courses. The remaining three courses (if not BME courses) need to be approved by the Graduate Program Director.

<sup>3</sup> Note that undergraduate course (e.g. 100-499) cannot be used to satisfy your graduate degree requirements. If there is an undergraduate course that is needed to supplement your understanding of a particular you will still be required to take the appropriate number of graduate courses shown in Table 1.

<sup>4</sup> Also note that selection of technical electives should be done in conjunction with your major advisor (or the graduate program director). Students that enroll in non-BME courses without the appropriate prior approvals **WILL NOT** be given approval retroactively.

An overall grade point average of 3.0 must be maintained in all formal coursework to be awarded an M.S. degree in BME.

### **Final Thesis Defense (Applicable for Students on the M.S. Thesis Track Only)**

An oral and written examination is required for all M.S. students that are pursuing the thesis track. This written document and the oral defense of the written document must meet all acceptable practices associated with the reported work (e.g. must follow IACUC protocols if working with animals) and must reflect the students work and understanding of this work. It is not acceptable for the major advisor to write and/or defend the written document for the student.

#### Examining Committee

The M.S. examining committee will consist of at least 3 graduate faculty members, 3 of which (or a majority) must be BME Core Faculty or BME Program Faculty members. The examining committee is formed in conjunction with your major advisor and must be approved by the Graduate Program Director, prior to the oral defense. Please send a list of committee members, with their roles (e.g. committee chair, major advisor, regular member or outside member) via email to the Graduate Program Director for approval. The chair of your committee can not be your major advisor, but it is expected that your major advisor is a full voting member of your committee.

#### Form of Examination

You must prepare a written report of your research/scholarly activities that typically includes a background section, a methods section, a results section and a discussion section. Other sections (e.g. future work, aims, and limitations) can be included at the discretion of the student and the examining committee. There is no set page limit for this document, but the committee will evaluate the quality of the report and the quality of the work presented and **NOT** the quantity of pages prepared. This report should be submitted to your approved examining committee a minimum of fourteen (14) days prior to the defense date.

Submission of your written report within 14 days of your examination may delay your defense at the discretion of the examining committee. On your defense date, you will be expected to make a twenty- to thirty-minute presentation of your thesis. This is immediately followed by questions/answers from the audience in the open portion of your defense. Following this, the examining committee will ask questions during a closed session. These questions can evaluate your understanding of the presented work but at the same time the committee can evaluate your understanding/competency in general BME coursework and coursework related to your chosen field of study. Typically, the examination does not exceed 2 hours. Note that it is the role of the committee chair to coordinate the public and closed question/answer sessions.

#### Results of the Examination

After all question/answer sessions your examining committee will deliberate in a closed session, whether you have shown sufficient expertise/understanding of your chosen field and BME in general. They may announce their recommendation immediately following a closed majority vote. The recommendation will be one of the following: 1) pass, 2) conditional pass, with minor changes before final approval will be granted, 3) undergo a major rewrite or include additional experiments that requires a second examination or 4) fail. Note that the fail recommendation will not be given until the student has had the opportunity to retake the examination once. Only under extenuating circumstances will the

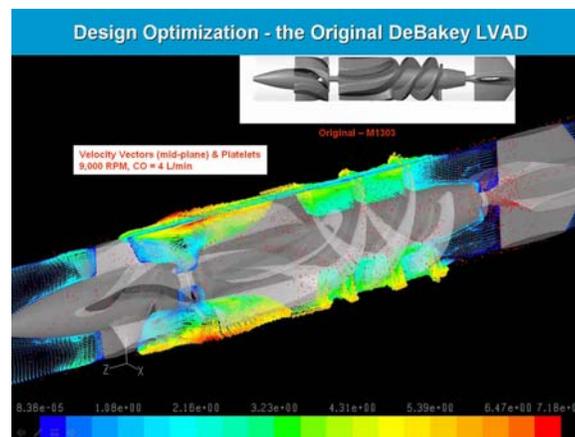
student be allowed to petition to the Graduate Program Director for re-consideration after a resulting fail.

### Report of M.S. Final Thesis Defense

The examining committee chair will be responsible for summarizing the results of the M.S. thesis defense, including the results of the examination to the student, the main thesis advisor of the student, all members of the committee, the Graduate Program Coordinator and the Graduate Program Director. An email summary of the results should be sent to the highlighted people within 24 hours of the final defense. Once the final decision is a “pass” the Graduate Program Coordinator and the Graduate Program Director will be responsible for clearing the student for graduation.

### Procedures of Administration

- The SBU Graduate School specifies the correct format for the final thesis. Go the Graduate School website for the current specifics regarding the format of this document
- You are responsible for meeting all thesis submission deadlines set by the Graduate School. Missing these deadlines may delay your graduation.
- You are responsible for obtaining all signatures required on the signature page of your thesis. Original signatures are required by the Graduate School. It is a good idea to make at least one photocopy of the original signed signature page for your records. The Graduate Program Coordinator can also retain a copy of the original signature page.
- If you so desire, you are responsible for setting-up an appointment(s) with the Graduate School to ensure that your thesis is correctly formatted.
- You must notify the Graduate Program Coordinator and the Graduate Program Director, via email, of your thesis date, time and location at least 48 hours prior to your defense. This will provide the BME Graduate Program with sufficient time to announce your defense to the other students and BME faculty.
- The Graduate Program Coordinator can help you reserve a BME conference room for your final defense.
- You are responsible for submitting your final thesis electronically to the Graduate School. More information regarding the submission process can be found on the Graduate School website.
- Make sure to obtain and complete the BME Exit/Clearance Form.



# Doctoral Degree – Sequence

The following is a sequence of requirements compiled from both the Department of Biomedical Engineering and the Graduate School of Stony Brook University. Failure to comply with these requirements in a timely manner may result in enrollment holds, payroll delay (as applicable) and/or a delay in graduation. Note that there may be some differences depending on your graduate level at the time of matriculation (e.g. G3 vs. G4 students).

## Week of Arrival

1. All students must report to the Biomedical Engineering department and meet with the Graduate Program Coordinator to obtain a new student information packet and to schedule a meeting with either the BME Graduate Program Director or your pre-approved faculty advisor to make enrollment selections for the upcoming semester.
2. Activate your Stony Brook University email account and make sure to check in with your housing provider and international student services (as applicable).
3. If you were offered an assistantship, you will need to obtain and complete payroll forms.
4. Attend all University, Graduate School and Biomedical Engineering Department orientations, including the BME Graduate Student Research Day.

## First Year of Coursework

1. Enroll in courses (with advice from the Graduate Program Director, the Graduate Program Coordinator and/or your pre-approved faculty advisor) that will help you decide what track you would like to focus on and which advisor/field of study you would like to pursue.
  - a. All students, regardless of their graduate level, should enroll in BME 501, BME 502 and BME 505. If you want to petition out of these courses, you are responsible for contacting the instructor of record and obtaining their approval. The Graduate Program Director and Graduate Program Coordinator must be included within all correspondences between the instructor of record and the student requesting an exemption from these courses.
2. For students that matriculate as G3 students, enroll in BME 520 and BME 521. The goal of these courses is to give the student an opportunity to learn about the research being conducted in the lab and the manner in which the faculty administer their lab.
3. For students that matriculate as G4 students, enroll in BME 520 and BME 521 (if you do not have a pre-approved advisor) or BME 599 (if you have a pre-approved advisor).
4. Faculty advisors can be chosen from either core faculty members or program faculty members.

## First Summer

1. Students who have matriculated with Advanced Standing (e.g. G4) should take their first qualifying exam. Under extenuating circumstances, Advanced Standing students can petition the Graduate Program Director to postpone their first qualifying exam to the following winter. If the student fails the first qualifying exam, the student will be expected to take their second qualifying exam at the earliest opportunity.

## **Second Year of Coursework**

1. Students who have not matriculated with Advanced Standing (e.g. G3 at matriculation), should finish the M.S. requirements. In consultation with your major advisor, the student should determine if they will pursue the M.S. thesis track of the non-thesis track.
  - a. If you are pursuing a thesis, please refer to all requirements in the M.S. thesis section of this document. All deadlines and requirements are the same for these students.
2. Students who have matriculated with Advanced Standing (e.g. G4) have no particular formal course requirements, but it is the student's responsibility to discuss with their major advisor what courses, if any, they should take to supplement their research.

## **Second Summer**

1. Students who have not matriculated with Advanced Standing (e.g. G3 at matriculation) should take their first qualifying exam. Under extenuating circumstances, these students can petition the Graduate Program Director to postpone their first qualifying exam to the following winter. If the student fails the first qualifying exam, the student will be expected to take their second qualifying exam at the earliest opportunity.

## **Within 1 Year of Passing Your Qualifying Exam**

1. All students should organize with the help of their major advisor, a proposal/dissertation examining committee. The committee should consist of a committee chair, your major advisor, a faculty member external to the BME Graduate Program and a majority of members internal to the BME Graduate Program. Typical dissertation committees consist of at least 4 examiners.
2. The Committee make-up must be approved by the Graduate Program Director, prior to the defense, using the Graduate School Request for Defense Committee Appointment form.
3. Within 1 year of passing the qualifying examination, all students should schedule and take the proposal defense examination (but no later than 15 months). Successfully passing the proposal defense examination will advance the student to candidacy.
4. Students who have passed the 15 month window between the Qualifying Examination and Proposal Defense, will be given the lowest priority for the Program allocated Graduate Tuition Scholarship (GTS). In the case when the Program cannot support your GTS, your dissertation advisor may be able support the GTS from grant allocations. Note that by Graduate School Policy, if you do not have a GTS for one academic semester, the Graduate School *will not* cover your GTS when you advance to candidacy (G5 standing)

## **Semester of Graduation**

1. In conjunction with your major advisor, work on and complete your dissertation.
2. Meet with the Graduate Program Coordinator to see if you have met all requirements on the Ph.D. student Graduation Checklist.
3. Apply for Graduation (through Solar).
4. Schedule your final defense with sufficient time to allow for corrections and additional work requested by your faculty committee.
5. Make sure that all graduation paperwork is completed and submitted in a timely manner.
6. Complete and submit your BME Exit/Clearance Form.

# Doctoral Degree – Requirements

The minimal University requirements for the Ph.D. degree in Biomedical Engineering are determined by the Graduate School and can be found in the University Bulletin, which can be accessed at: <http://sb.cc.stonybrook.edu/gradbulletin/current/>. We in BME, have additional requirements in several areas.

## Plan of Study

Your coursework is determined 1) in conjunction with your major advisor and is 2) dependent on whether or not you matriculate with a Master's degree in an approved major. If you have an approved M.S. degree at matriculation, there are no course requirements per se, though certain courses may be required to fill any gaps in the student's knowledge (this is typically determined in conjunction with your major advisor). For students that enter without a relevant M.S. degree, all requirements for the M.S. degree must be met (See the Master's Degree Requirements) and once the M.S. degree is earned, there are no formal course requirements per se. To earn a doctoral degree, each student must pass a qualifying examination, a proposal defense examination and the final dissertation defense. Stony Brook University requires at least two consecutive semesters of full-time graduate study. Note that students must be enrolled appropriately to maintain tuition waivers, etc.

## Teaching Requirement

The BME teaching requirement for a doctoral degree can be satisfied in any of the three following manners.

1. Deliver 4 lectures in a BME undergraduate or graduate course and present a seminar that covers the state-of-the-art in your field of research.
2. Teach a BME course, either as the instructor of record (only for G5 students) or as the principal instructor (for G4 students).
3. Petition the Graduate Program Director for something else that is equivalent to the above.

## Qualifying Examination

The BME Qualifying Examination (QE) is offered twice a year; approximately running between January 1<sup>st</sup> and February 15<sup>th</sup> and between June 1<sup>st</sup> and July 15<sup>th</sup>. Most students should take their first QE during the summer session. The winter QE is typically taken by students who do not pass their first QE and for those students who have successfully petitioned for a postponement of their first QE.

### Format of the Examination

The BME QE principally consists of a grant application either based on an independent research project that you will conduct in your lab or based on specific research questions provided with the QE directions (the student is responsible to check which format of the exam is being offered when they take the exam). You will have one month (either January or June) to compose a grant application that addresses the specific problem. You will need to provide aims for your application, a strong rationale and background supporting the work, methods, preliminary work (that you completed, this is not required) and an experimental design section (including appropriate statistics, limitations, alternative approaches, etc.). During the last two weeks of the exam, the student will prepare an oral defense of this grant

application. The defense of this application will take place on or around February 15<sup>th</sup> (for the winter session) or July 15<sup>th</sup> (for the summer session). Prior to your defense date, you will be told the make-up of your examining committee and the date, time and location of your defense. At the defense, the examining committee will test your basic understanding of biomedical engineering and your specific understanding of your proposed work. It is typical for the oral defense to last approximately 2 hours. All details regarding specific requirements and formatting will be provided at the time of your examination:

#### Outcome of the Examination

The outcome of the examination is either 1) Pass or 2) Fail. Students will be evaluated on the following four topics, as they relate to the specific proposal.

1. Demonstration of a balanced understanding of engineering, biological and medical issues in the given field. This does not assume an even distribution between the three topics.
2. Demonstration of a rigorous understanding of the process of scientific inquiry.
3. Demonstration of command of the specific technical issues that are fundamental to the given field.
4. Demonstration of the ability to effectively communicate in a written or oral fashion, scientific and engineering information.

Each voting member of your QE committee will evaluate the candidate on each of these four topics. A failure in any one of these topics by the majority of the committee, will result in a failure in the entire QE (e.g. you must pass each of the four categories by a majority vote of the voting members of your examining committee).

Within 24 hours of the QE oral defense, the chair of the examining committee will provide the results of the examination to the student, the Graduate Program Coordinator and the Graduate Program Director. A summary of strengths and weaknesses should be provided to the student regardless of the outcome of the examination.

Any challenge to the decision of the QE Committee must be reported directly to the Graduate Program Director within 1 week of the defense date. A sub-committee appointed by the Graduate Program Director or the Graduate Program Director will review the appeal and present an appropriate response to the appeal.

Any student that fails the BME QE twice will no longer be eligible for a Doctoral Degree in Biomedical Engineering at Stony Brook University.

#### Objectives of the Qualifying Examination

1. Redirect candidates with poor prospects of success in the Ph.D. program before the students have made large investments of time and resources.
2. Provide a focal point for the student's major advisor to evaluate the student's potential and consider courses that may be required to supplement the student's research project.
3. Demonstrate the student's familiarity with literature, ability to organize a research proposal, competence in written and oral communications and understanding of biomedical engineering fundamentals and areas of research specific to the students research focus.

## **Dissertation Proposal Examination**

After successful completion of the qualifying examination, the student officially selects a major dissertation advisor and writes a proposal for dissertation research. The proposal is orally defended before a dissertation examination committee. The dissertation committee make-up is described elsewhere, but is formed in conjunction with the major advisor and is approved by the Graduate Program Director, prior to your defense. Briefly, a minimum of four members are required (3 internal to the Program in Biomedical Engineering and 1 external to the Program in Biomedical Engineering).

### Examining Committee

The Ph.D. examining committee will consist of at least 4 members, 3 of which (or a majority) must be BME Core Faculty or BME Program Faculty members. 1 member of the committee must be external to the BME Program. The examining committee is formed in conjunction with your major advisor and must be approved by the Graduate Program Director, prior to the oral defense. Please send a list of committee members, with their roles (e.g. committee chair, major advisor, regular member or outside member) via email to the Graduate Program Director for approval. The chair of your committee can not be your major advisor, but it is expected that your major advisor is a full voting member of your committee. The graduate school Request for Defense Committee Appointment is required.

### Format of the Examination

This examination consists of a written dissertation proposal and an oral defense of that proposal. The written proposal should be prepared in conjunction with your major advisor and typically consists of a discussion of the specific aims of your proposed dissertation, the background that sets the foundation for your proposal, preliminary work that you have completed in relation to your proposed dissertation and an experimental design/research strategy section that describes the work that you will undertake to complete your dissertation. While there are no specific requirements for the written portion of the examination, it is best that you follow the current dissertation requirements established by the Stony Brook Graduate School (since some of the pieces of this proposal may be used in your final dissertation).

The oral defense of your proposal will consist of a portion open to the public and a closed portion. You should present your proposal in approximately 30-40 minutes and describe in sufficient detail the background, preliminary work and proposed studies. This will immediately be followed by a question and answer session from the public. Typically, after the open portion, the student will be asked to leave briefly, while the examining committee discusses the proposal. The student will then be asked questions relative to the proposal and their basic understanding of the biomedical engineering concepts that set the foundation for this proposal.

Note that the Biomedical Engineering Department suggests that the proposal examination takes place within one year from passing the qualifying examination (but no later than 15 months) and a minimum of two (2) full semesters prior to the anticipated graduation semester. Those students who exceed the 15 month window will be given lowest priority for the program allocated Graduate Tuition Scholarship (GTS).

### Outcome of the Examination

The chair of the proposal examination committee will summarize the discussion of the committee and will provide a written document (by email is acceptable) to the student, the major advisor of the student, the Graduate Program Coordinator and the Graduate Program Director. This document should provide the outcome of the examination, which can be one of the following:

- 1) Pass
- 2) Conditional Pass with Minor Corrections (e.g. re-write) – this may require a second defense as determined by the examining committee
- 3) Fail – which may require an additional defense of the proposal or result in your termination from the doctoral program

The document will also detail, what work needs to be included within the final dissertation to satisfy committee requirements at this time. Note that it may be possible that some of these requirements change based on the findings of the work, among other intangibles. It is best to periodically update your committee between your proposal defense and your final defense, however, there is no formal requirement.

Any challenge to the decision of the Proposal Committee must be reported directly to the Graduate Program Director within 1 week of the defense date. A sub-committee appointed by the Graduate Program Director or the Graduate Program Director will review the appeal and present an appropriate response to the appeal.

### Objectives of the Proposal Examination

1. Redirect candidates proposals to more appropriate/realistic research avenues before the students have made large investments of time and resources.
2. Provide a focal point for the student's major advisor to evaluate the student's potential and consider courses that may be required to supplement the student's research project.
3. Demonstrate the student's familiarity with literature, ability to organize a research proposal, competence in written and oral communications and understanding of biomedical engineering fundamentals and areas of research specific to the students research focus.

### **Advancement to Candidacy**

After successful completion of all required and elective courses, the qualifying examination, and the dissertation proposal examination, the student will be recommended to the Graduate School for advancement to candidacy. The Graduate Program Coordinator will prepare and submit the appropriate paperwork for advancement to candidacy.

### **Final Dissertation Defense**

The research for the Ph.D. dissertation is conducted under the supervision of the dissertation committee. The dissertation must represent a significant contribution to the scientific and/or engineering literature. Upon approval of the completed dissertation by the dissertation committee (which typically is the same committee that was established for the proposal defense), a formal public oral defense of the dissertation is scheduled at which time the student presents their findings and is questioned by members of the examining committee and by other members of the audience. On acceptance of the dissertation by the examining committee, all requirements for the

degree will have been satisfied. Note that the format of this defense is very similar to the proposal format, except that all of the work that was proposed should be completed at this point. Additionally, note that the Graduate School sets all formatting requirements and it is the student's responsibility to ensure that their dissertation meets all Graduate School requirements.

It is also important to note that the written document and the oral defense of the written document must meet all acceptable practices associated with the reported work (e.g. must follow IACUC protocols if working with animals) and must reflect the students work and understanding of this work. It is not acceptable for the major advisor to write and/or defend the written document for the student.

#### Outline of the Final Dissertation Defense

1. A written document is prepared that is composed of multiple sections (e.g. specific aims, background, results, discussion) as determined by you, your dissertation advisor and the examining committee.
2. The dissertation is defended publicly and in a closed forum, at which time the student will be asked questions to evaluate their thorough understanding of their field of study.
  - a. Please make sure to provide the details of the defense to the Graduate Program Coordinator and Graduate Program Director so it can be announced to members of the SBU BME community, at least 48 hours prior to the defense date.
  - b. Also note that you must inform the Graduate School of your defense date prior to your defense. The form can be found on the graduate school website and a copy of the form should be provided to the Graduate Program Coordinator. The Graduate School is responsible for publicly announcing your defense.
3. After the committee deliberates one of the following outcomes will be reached:
  - a. Pass
  - b. Conditional Pass with Minor Corrections – required corrections will be described to the student
  - c. Fail – which can result in the termination of the student from the doctoral program
4. A written outcome of the defense (email is sufficient) must be provided to the student, the major advisor of the student, the Graduate Program Coordinator and the Graduate Program Director within 24 hours of the defense date, by the chair of the examining committee. A summary of any required corrections should also be provided at this time.

The Graduate Program Coordinator and the Graduate Program Director will be responsible for clearing the student for graduation.

#### Procedures of Administration

- The SBU Graduate School specifies the correct format for the final dissertation. Go the Graduate School website for the current specifics regarding the format of this document.
- You are responsible for meeting all dissertation submission deadlines set by the Graduate School. Missing these deadlines may delay your graduation.
- You are responsible for obtaining all signatures required on the signature page of your dissertation. Original signatures are required by the Graduate School. It is a good idea to

- make at least one photocopy of the original signed signature page for your records. The graduate program coordinator can retain a copy of the signature page.
- If you so desire, you are responsible for setting-up an appointment(s) with the Graduate School to ensure that your dissertation is correctly formatted.
  - You must notify the Graduate Program Coordinator and the Graduate Program Director, via email, of your dissertation date, time and location at least 48 hours prior to your defense. This will provide the BME Graduate Program with sufficient time to announce your defense to the other students and BME faculty. Note, that you also must notify the Graduate School via the “Doctoral Defense Announcement Form.” The Graduate School deadline for submission of this form may be different than the internal BME deadline.
  - The Graduate Program Coordinator can help you reserve a BME conference room for your final defense.
  - You are responsible for submitting your final dissertation electronically to the Graduate School. More information regarding the submission process can be found on the Graduate School website.
  - Make sure to obtain and complete the BME Exit/Clearance Form.

### **Time Limit/Residency Requirements**

All requirements for the Ph.D. degree must be completed within seven years after completing 24 credits of graduate study. The University requires at least two consecutive semesters of full-time graduate study.

### **Publications**

You are strongly encouraged by the BME Department to publish technical papers based on the research obtained throughout your dissertation. This is not a requirement.



# Medical Physics Track Information

## Deadline and Application Procedures

Application to the Medical Physics Track is made through the graduate Biomedical Engineering Department. Students specifically applying for the Medical Physics Track will be reviewed for acceptance to Biomedical Engineering and Medical Physics. Matriculated students already accepted into Biomedical Engineering but not Medical Physics may apply to the track prior to January 1 each year. The application includes all previous Biomedical Engineering application information, copies of current graduate transcripts and a letter of support from a Medical Physics faculty member. A general condition of completion of BME 517 with a grade of “A-” or higher and the completion of the equivalent of a minor in physics is also required. Students may be accepted with some deficiencies at the discretion of the medical physics entrance committee. Classes taken to overcome deficiencies will be in addition to the standard Medical Physics curriculum.

## Course Requirements

The core courses that all new graduate students in BME must take are applicable for the Medical Physics Track. These course include:

- BME 501
- BME 502
- BME 505
- BME 520
- BME 521

Medical Physics Track students are also required to take:

- BME 517
- BME 518
- BME 519
- BME 530
- BME 540 or BME 610
- In addition, a course in anatomy is required.

Note that students can elect to complete this option with or without a thesis. Additional coursework may be required if students elects to complete a thesis.

## Course Sequence

Completion of the Medical Physics Track would lead to an M.S. in BME plus a certificate attesting that the graduate completed a CAMPEP approved program. By virtue of this degree and certificate, graduates would be able to attend a CAMPEP accredited residency program and eventually sit for the national board examination.

# English Proficiency Requirements

All new incoming and transfer Ph.D. students as well as supported M.S. students and any for whom the TOEFL has been waived and any for whom English is not the first language, must be tested for English Proficiency. A recent TSE (Test of Spoken English from ETS) can substitute for the SPEAK test. The Oral Academic English (OAE) Program from the Linguistics Department administers the exam and determines if English Proficiency is met. The OAE Office in the Social and Behavioral Science Building, room N-252. All students that are required to take a test of English Proficiency should enroll for the test during orientation.

The test is necessary to follow the guidelines set up by the Faculty Senate to improve the undergraduate experience here at SUNY by carefully training the international teaching assistants in pedagogical, linguistic and cultural awareness areas.

The SPEAK (Speaking Proficiency English Assessment Kit) test is used to determine proficiency. The test has a score range of 20 – 60.

## Outcome of the Examination

Under 39: the student needs Intensive English Center Work (Contact 631-632-7031)

40-44: the student needs OAE 590 Intermediate Oral/Aural Skills Class. The student cannot be given grading, recitation sessions or other TA responsibilities. A grade of “B” or higher in OAE 590 advances the student to OAE 592

45-49: OAE 596 High Intermediate Oral/Aural Skills Class. The student is permitted to grade or conduct recitation sessions. A grade of “B” or higher in OAE 592 advances the student to OAE 594.

50-54: OAE 594 Advanced Oral/Aural Skills Class. The student can conduct all TA responsibilities. A grade of “B” or higher in OAE 594 results in no more OAE support required for the student.

55 and higher: The student is exempt from OAE support and can be a TA.



# Teaching and Research Assistantships

## Teaching Assistantships (TAs)

A limited number of teaching assistantships are offered each semester. Most TA offers are made when/if the department extends an offer of admission to the Program in Biomedical Engineering. If additional TA positions are available, the department will evaluate all current students and will try to match available positions with existing student expertise. When making a decision regarding additional TA positions, we will consider a prior demonstration of hard work, motivation, and grade point average in relevant courses. TA positions generally require an average of 20 hours of work per week. Duties assigned to TAs can include: lead office hours, assist in the laboratory, grade papers, among other miscellaneous activities.

TAs must complete training in regards to ethical conduct, conflict management and other training that may be required for your specific duties (e.g. laboratory safety training). It is important to understand that TAs may be acting as lab supervisors, as such, they must report lab accidents to the instructor on record (accidents can involve students enrolled in the course and/or the TA themselves).

## TA Reappointment Information

It is the policy of the BME department that only students with an overall GPA of 3.0 are eligible to be considered for a teaching assistantship. Additionally, your performance in previous TAs may be used to consider reappointment in future TAs.

## Research Assistantships (RAs)

Many graduate students are hired by faculty members to work on funded research projects. These students conduct research for faculty member(s). In general, M.S. students will not be offered RAs until demonstrating at least one semester of hard work, motivation and research proficiency within the lab of the advisor. In many cases, M.S. students will not be offered RAs during their course of study. Doctoral students (either those that come in with a M.S. degree or those that do not come in with a M.S. degree) may be offered RAs after demonstrating hard work and proficiency after a lab rotation. It is highly suggested that students that would like to enter the program with advanced standing obtain an RA prior to matriculating at the university. The duties assigned to an RA will be dependent on the specific lab and the specific major advisor.

RAs must complete appropriate environmental health and safety training that is specific for the lab that they are working in. Each lab will have different requirements and it is the students and faculty mentor's responsibility to ensure that the student is trained appropriately to conduct research in the lab. It is also important for RAs to understand reporting requirements related to lab accidents. Speak with your specific PI to find out the reporting procedures used in your specific lab.

## RA Reappointment Information

Reappointment of RAs will be at the discretion of the individual faculty member. The faculty member may consider performance in formal coursework, lab performance and availability of funding.

# Forms

## Common Graduate School Forms

All current forms as published by the Graduate School can be found on their website:

<https://www.grad.stonybrook.edu/forms/>. Make sure to access this website for the most up-to-date forms, which change periodically.

- Change of Graduate Program and/or Academic Level: This form is used to change between the M.S. and Ph.D. program in either direction.
- Change of Graduation Date: This form is used to change your graduation date due to unanticipated delays in your graduation date. This form is only for students that have applied for graduation.
- Request for Defense Committee Appointment: This form is used to 1) appoint your dissertation committee (approval by the Graduate School Dean is required) and 2) to receive authorization to schedule a dissertation defense. This form must be completed at least four to six weeks prior to your anticipated defense date to provide enough time for graduate school processing. It is suggested to submit this form as soon as your committee is formed internally. Additionally, this form is used for changes to your dissertation committee.
- Advancement to Candidacy: This form is submitted by the Graduate Program upon successful completion of your proposal examination. This form is required to advance student status from G4 to G5. Note that the graduate school also uses this form to determine if you have completed a minimum of 2 full semesters between your proposal examination and final dissertation defense. Make sure you are aware of the deadlines for status change to take effect. Waivers of this requirement are not guaranteed to be approved.
- Doctoral Defense Announcement Form: The Graduate School is responsible for approval and announcement of each doctoral defense at Stony Brook University. This form is to make the Graduate School aware of an anticipated doctoral defense and must be submitted at least three to four weeks prior to the proposed doctoral defense date.
- Request for Letter of Completion: Upon completion of your dissertation, you may take a position that requires confirmation that your degree is complete. Stony Brook University and the Graduate School, may not have the time to confer the degree prior to your start date. This form is used to provide confirmation that you have completed all requirements for your degree prior to final approvals.

## Biomedical Engineering Forms

- BME Student Expectation Form: This form is intended to make students aware of what that they are responsible for during their degree progression (e.g. enrollment in courses).
- Graduation Checklist: This internal form should help you ensure that you have made all graduation requirements. This form is not necessary but should help you plan your coursework.
- Exit/Clearance Form: This form will help the BME department to keep in contact with you upon graduation and will help BME ensure that you have cleared all administrative requirements (e.g. turned in your lab keys).

# Online Resources

**Department of Biomedical Engineering:** <http://www.bme.stonybrook.edu/>

Graduate Program Overview: <http://www.bme.stonybrook.edu/grad/index.html>

Degree Requirements: <http://www.bme.stonybrook.edu/grad/degree.html>

Medical Physics Track: <http://www.bme.stonybrook.edu/grad/medicalphysics.html>

Core Faculty Profiles: [http://www.bme.stonybrook.edu/people/faculty/fac\\_core.html](http://www.bme.stonybrook.edu/people/faculty/fac_core.html)

Program Faculty Profiles: [http://www.bme.stonybrook.edu/people/faculty/fac\\_program.html](http://www.bme.stonybrook.edu/people/faculty/fac_program.html)

**Stony Brook University:** <http://www.stonybrook.edu/>

Graduate Bulletin: <http://sb.cc.stonybrook.edu/gradbulletin/current/>

SOLAR: <http://it.stonybrook.edu/services/solar>

Campus Maps: <http://www.stonybrook.edu/sb/maps>

Environmental Health and Safety: <http://www.stonybrook.edu/ehs/>

Research Compliance: <http://research.stonybrook.edu/orc>

**Graduate School:** <https://www.grad.stonybrook.edu/>

**Office of the Registrar:** <http://www.stonybrook.edu/commcms/registrar/>

**Bursar:** <http://www.stonybrook.edu/bursar/>

**Visa and Immigration Services:** <http://www.stonybrook.edu/commcms/visa/>

**Campus Residences (On-Campus Housing):** <http://studentaffairs.stonybrook.edu/res/>

**Science and Engineering Library:** <http://guides.library.stonybrook.edu/science-and-engineering-library>

**Parent F31 NIH NRSA Award:** <http://grants.nih.gov/grants/guide/pa-files/PA-14-147>

**NSF Graduate Fellowship:** [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=6201](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201)